

SUMMARY OF MODELING FOR THE LACASSINE SYRUP MILL

WATER QUALITY ASSESSMENT DIVISION

MARCH 14, 2005

Executive Summary

The Louisiana Agricultural Finance Authority is building a sugar cane processing mill near the Village of Lacassine for the production of syrup which will be transported to other nearby mills for processing to raw sugar. The facility will be leased to and operated by Lake Charles Cane – Lacassine Mill, LLC, a company formed by the Lake Charles Cane Cooperative. The Lacassine Sugar Mill will discharge about 0.6 mgd of process wastewater to a tributary of West Bayou Lacassine between Interstate 10 and the Southern Pacific RR Line about 0.65 miles west of Highway 101. A scale drawing of the streams of the West Bayou Lacassine watershed and some of the roads is attached as Figure 1. Wasteload allocations for the summer (March – November) and winter (December – February) seasons have been developed for this discharge, and will be incorporated in the Bayou Lacassine TMDL as follows:

Summer season

CBOD5 (maximum) 5.0 mg/l

Dissolved Oxygen (minimum) 5.0 mg/l

22% reduction of nonpoint source load

Monitor dissolved oxygen in receiving
stream

Winter season

CBOD5 (maximum) 10.0 mg/l

Dissolved Oxygen (minimum) 5.0 mg/l

Monitor dissolved oxygen in receiving
stream

These effluent limitations are contingent upon the 22% reduction of man-made nonpoint source loading. The model shows that the summer water quality criterion of 3.0 mg/l DO for dissolved oxygen will not be met without the reduction in the nonpoint source loading. The requirement that best management practices be implemented to achieve a 22% reduction of man-made nonpoint loading in the West Bayou Lacassine watershed will be incorporated into the Water Quality Management Plan and subsequently, into the discharge permit for the syrup mill. Compliance with the required nonpoint reduction will be verified by monitoring dissolved oxygen for compliance with the criteria in the tributary at Abell Road and in both the tributary and West Bayou Lacassine at Ardoin Cove Road. A requirement to monitor the dissolved oxygen in the receiving stream year-round and report to LDEQ will also be incorporated into the discharge permit for the syrup mill.

The winter allocation for the mill has been made in compliance with the effluent standards cited by Title 33, Part IX of the Louisiana Regulatory Code, which allow effluent concentrations of 10 mg/l maximum CBOD5 and 4 mg/l minimum dissolved oxygen for discharge of treated wastewater from raw cane sugar processing. No nonpoint reduction is required for the winter season.

Introduction

The Louisiana Agricultural Finance Authority is building a sugar cane processing mill near the Village of Lacassine for the production of syrup which will be transported to other nearby mills for processing to raw sugar. The facility will be leased to and operated by Lake Charles Cane – Lacassine Mill, LLC, a company formed by the Lake Charles Cane Cooperative. The mill will grind sugar cane 24 hours per day for 100-120 days per year during the sugar cane harvesting season. Power for the operation of the mill will be generated by burning bagasse, natural gas, and gas from the Jefferson Davis Parish Landfill. Excess electricity will be sold to the local power grid. It is estimated that bagasse supplies accumulated during the grinding of sugar cane will support the generation of electricity for approximately 200 days, or for about 100 days following the cessation of grinding. Process wastewater from the mill will be treated in two ponds and recycled to the mill. Make-up water for this operation will come from a municipal water supply, Jefferson Davis Water Commission No. 1. The Lacassine Sugar Mill will discharge about 0.6 mgd of process wastewater to a tributary of West Bayou Lacassine between Interstate 10 and the Southern Pacific RR Line about 0.65 miles west of Highway 101. A scale drawing of the streams of the West Bayou Lacassine watershed and some of the roads is attached as Figure 1. Summer and winter season wasteload allocations have been developed for this discharge, and will be incorporated in the Bayou Lacassine TMDL.

Water Quality Criteria

Water quality criteria for Bayou Lacassine, Louisiana Subsegment 050601 of the Mermentau River Basin, include:

- Summer season (March through November) dissolved oxygen 3.0 mg/l minimum
- Winter season (December through February) dissolved oxygen 5.0 mg/l minimum
- Temperature 32 °C maximum
- Chlorides 90 mg/l maximum
- Sulfates 30 mg/l maximum
- Total dissolved solids 400 mg/l maximum

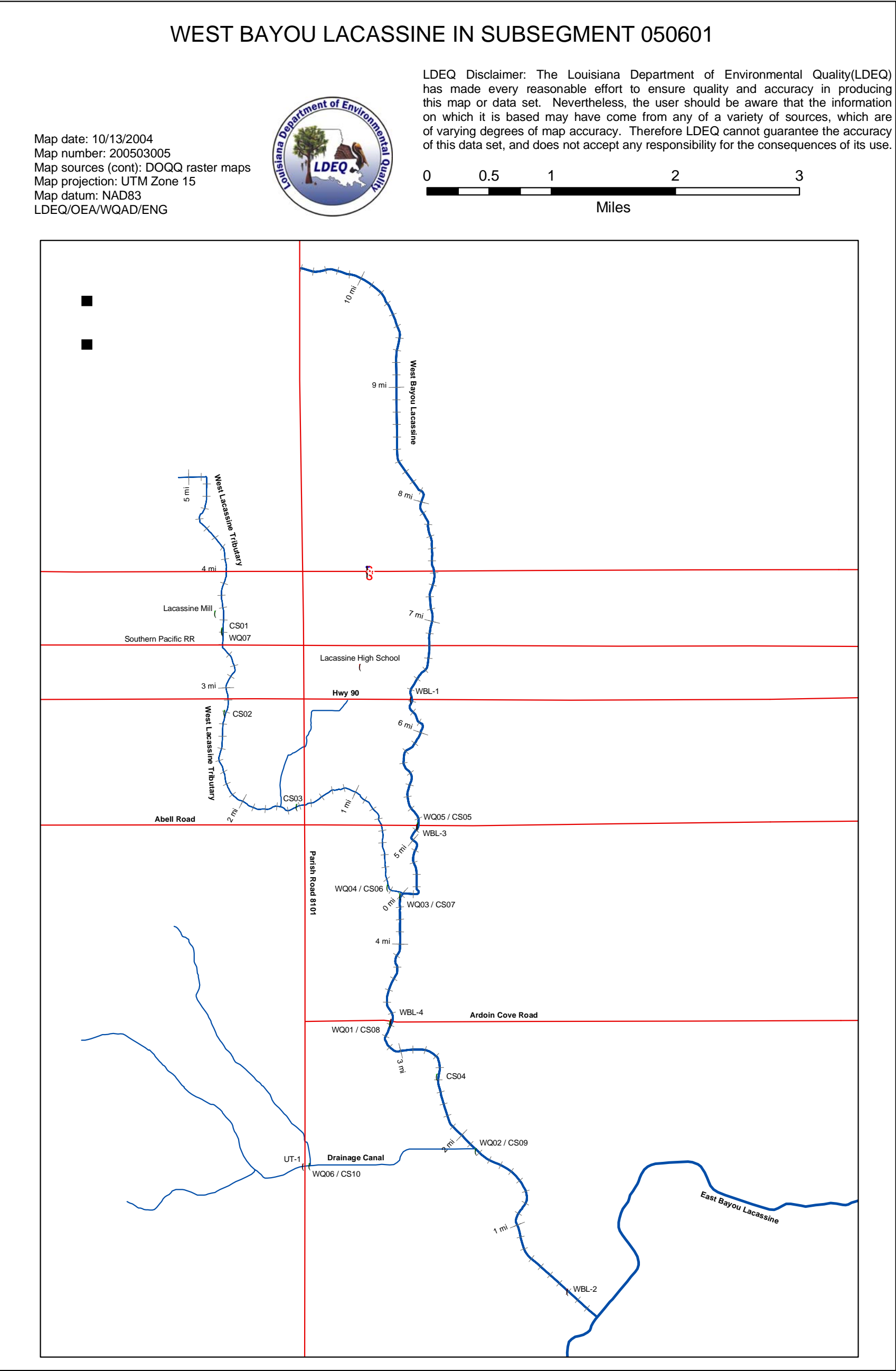
Existing Dischargers

Present dischargers to the Lacassine system are the town of Welsh (0.475 mgd) to East Bayou Lacassine and Lacassine High School (0.0092 mgd) to West Bayou Lacassine.

Previous Studies

Surveys in the Lacassine system have been conducted in 1991, 1999, and 2004, and the existing TMDL for Bayou Lacassine was developed in 2000 by FTN Associates of Little Rock, Arkansas, based on the 1999 survey.

Figure 1



Summer Season Wasteload Allocation Development

Water quality modeling has been performed to develop a wasteload allocation for the Lacassine Syrup Mill. The model of the tributary is based on data collected during a survey conducted by C.K. Associates on November 10 and 12, 2004. The West Bayou Lacassine model was developed by FTN Associates of Little Rock, Arkansas, as a part of the Bayou Lacassine TMDL, September 2000 revision.

The model of the tributary was calibrated to the November 2004 data and projected at critical summer season conditions of 30.1 °C and a default minimum flow of 0.1 cfs. The summer season for these waters is defined by the Environmental Regulatory Code as the months of March through November. That projection was then combined with the FTN summer season projection to create a combined summer season model of the tributary and West Bayou Lacassine. This model was then run at a variety of mill discharge CBOD concentrations and nonpoint load reductions. Figures 2 and 3 depict the results of these runs. A wasteload allocation of a maximum of 5 mg/l five day carbonaceous biochemical oxygen demand (CBOD5) and a minimum of 5 mg/l dissolved oxygen (DO) combined with a 22% reduction of man-made nonpoint loading in the West Bayou Lacassine watershed will allow the summer season water quality criteria of 3.0 mg/l DO to be met. Compliance with the needed nonpoint reduction can be verified by monitoring dissolved oxygen for compliance with the criteria in the tributary at Abell Road and in both the tributary and West Bayou Lacassine at Ardoin Cove Road. Figures 4 and 5 are the model dissolved oxygen projections for West Bayou Lacassine and for the tributary for 5/5 effluent limits and a 20% man-made nonpoint reduction. The minimum dissolved oxygen is projected to occur at the bottom of the tributary, just above it's junction with West Bayou Lacassine.

No limits for nitrogenous oxygen demand were included, in accordance with the February 1975 EPA "Development Document for Interim Final Effluent Limitations Guidelines" for Raw Sugar Cane Processing, which states:

"While various forms of nitrogenous compounds are present in waste waters resulting from the production of raw cane sugar, it has been determined that this potential pollutant is not present at a sufficient level to warrant treatment."

Figure 2

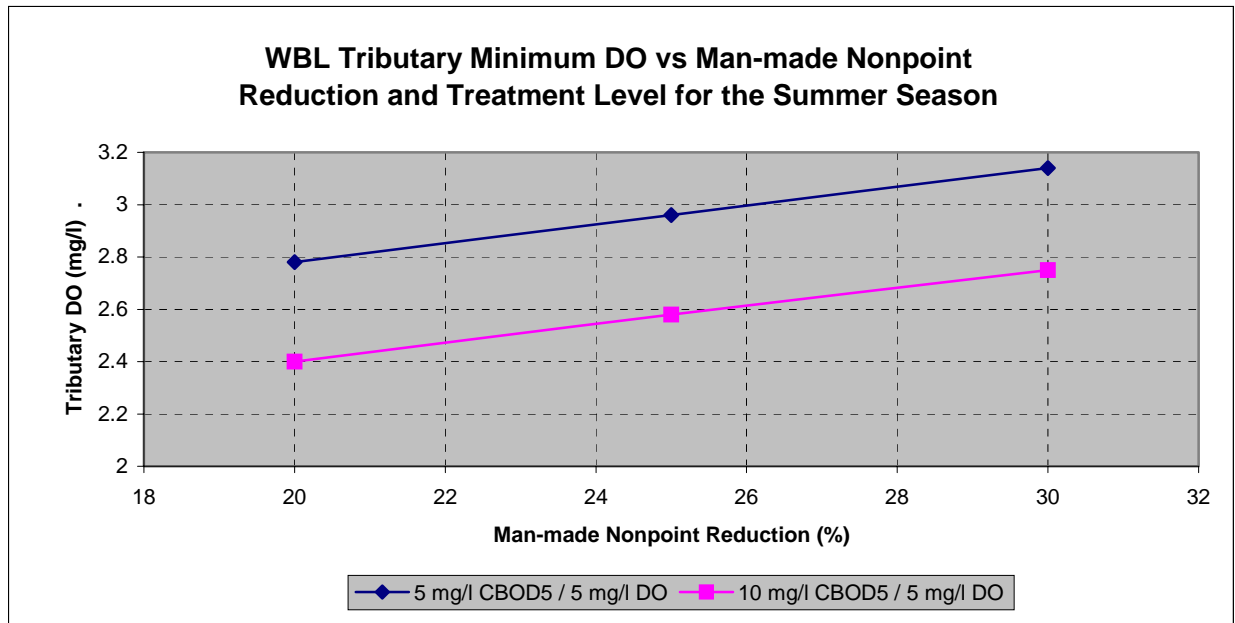


Figure 3

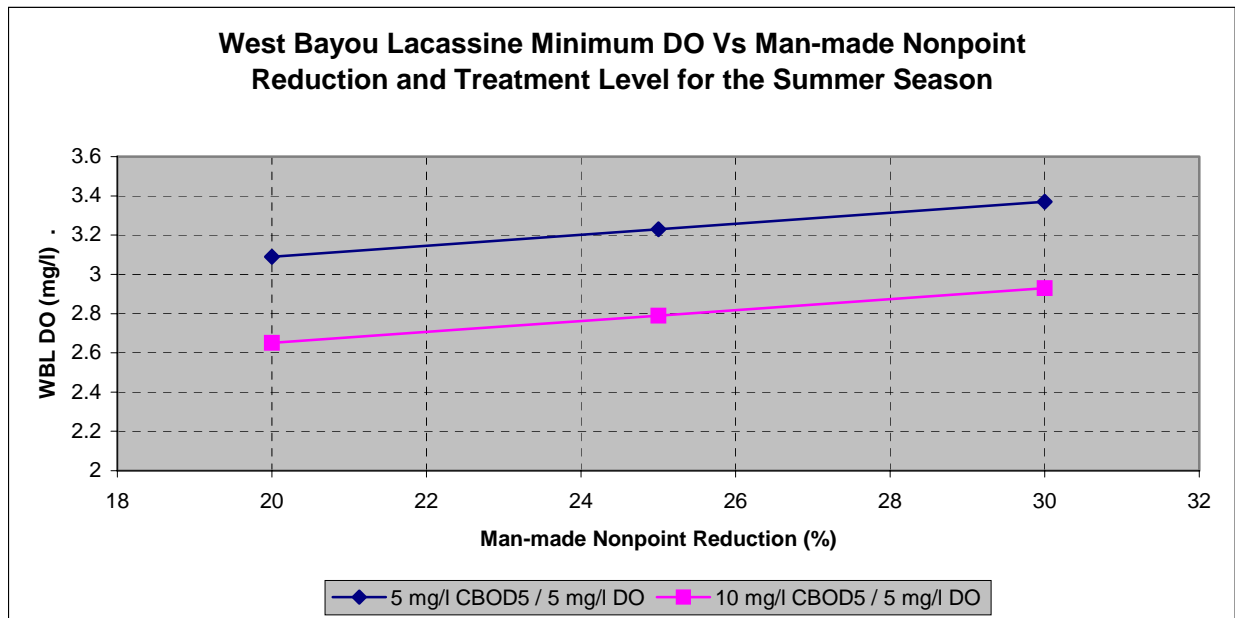


Figure 4

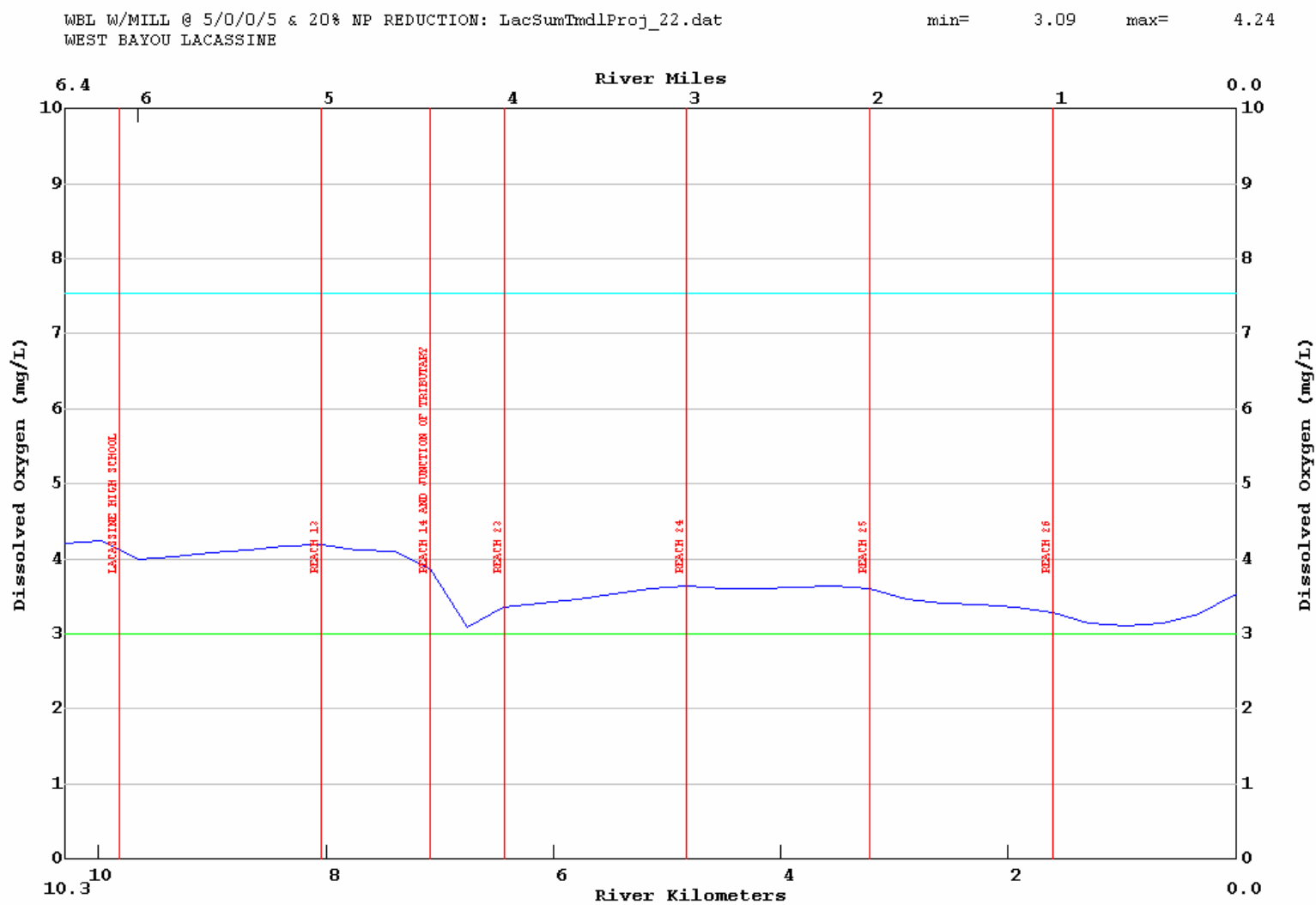
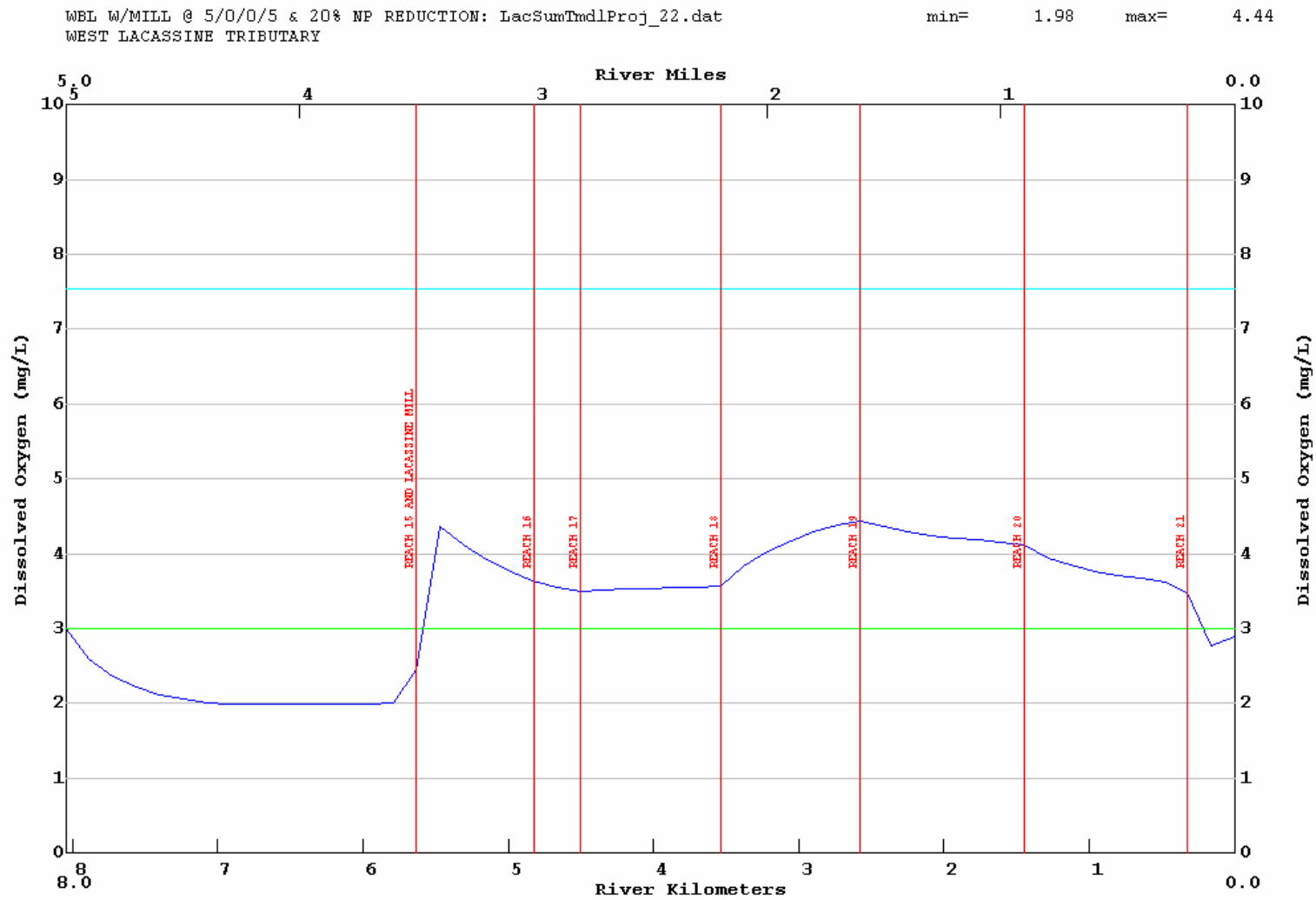


Figure 5



Winter Season Wasteload Allocation Development

Similar to the development of summer season allocations, the model was projected at critical winter season conditions of 15.1 °C and a default minimum flow of 1.0 cfs. The winter season for these waters is defined as the months of December through February. A wasteload allocation of a maximum of 10 mg/l five day carbonaceous biochemical oxygen demand (CBOD5) and a minimum of 5 mg/l dissolved oxygen (DO) will allow the winter season water quality criteria of 5.0 mg/l DO to be met. The winter allocation for the mill has been made in compliance with the effluent standards cited by Title 33, Part IX of the Louisiana Regulatory Code, which allow effluent concentrations of 10 mg/l maximum CBOD5 and 4 mg/l minimum dissolved oxygen for discharge of treated wastewater from raw cane sugar processing. No reduction of man-made nonpoint loading in the West Bayou Lacassine watershed is needed during the winter season. Figures 6 and 7 depict the results of these runs. Figures 8 and 9 are the model dissolved oxygen projections for West Bayou Lacassine and for the tributary for 10/5 effluent limits and with no man-made nonpoint reduction.

Figure 6

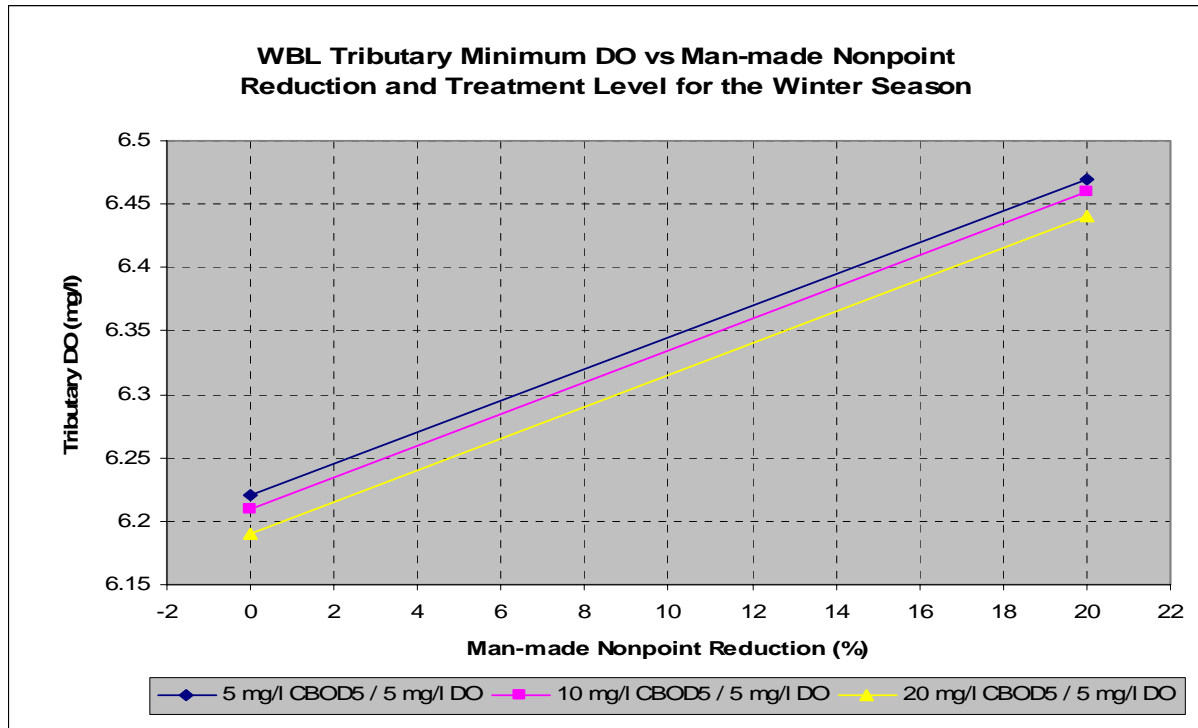


Figure 7

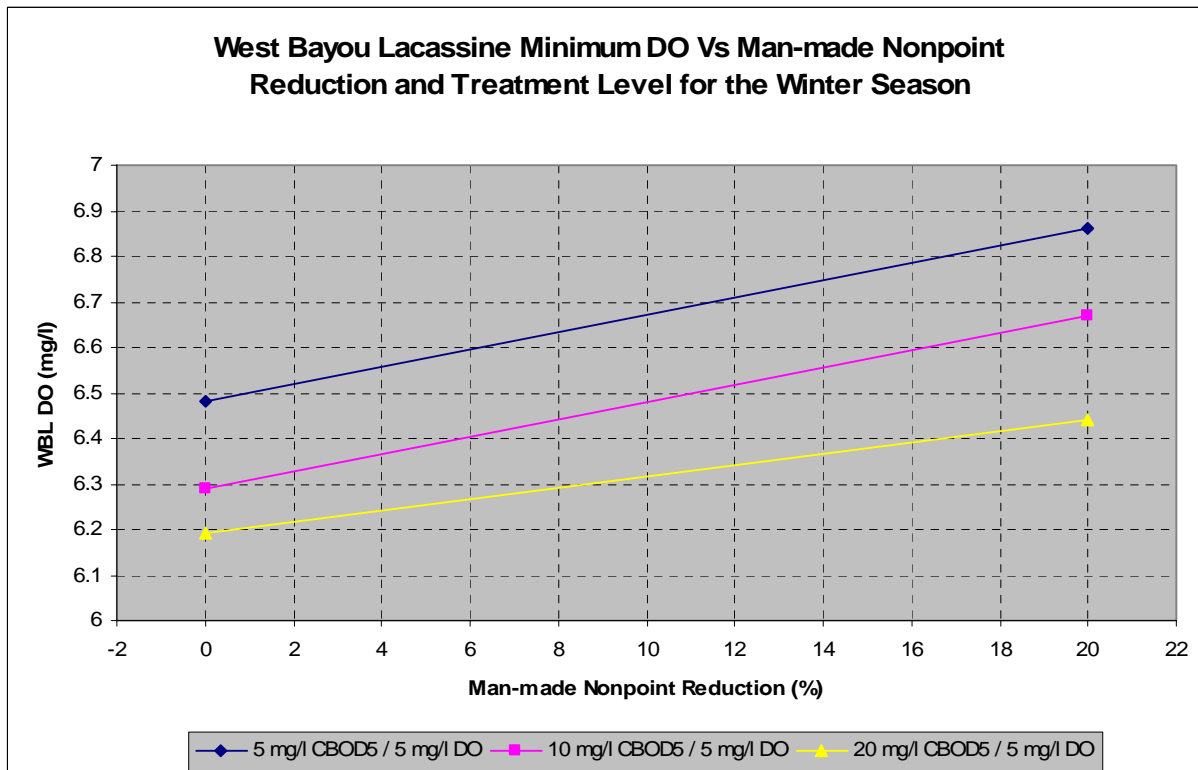


Figure 8

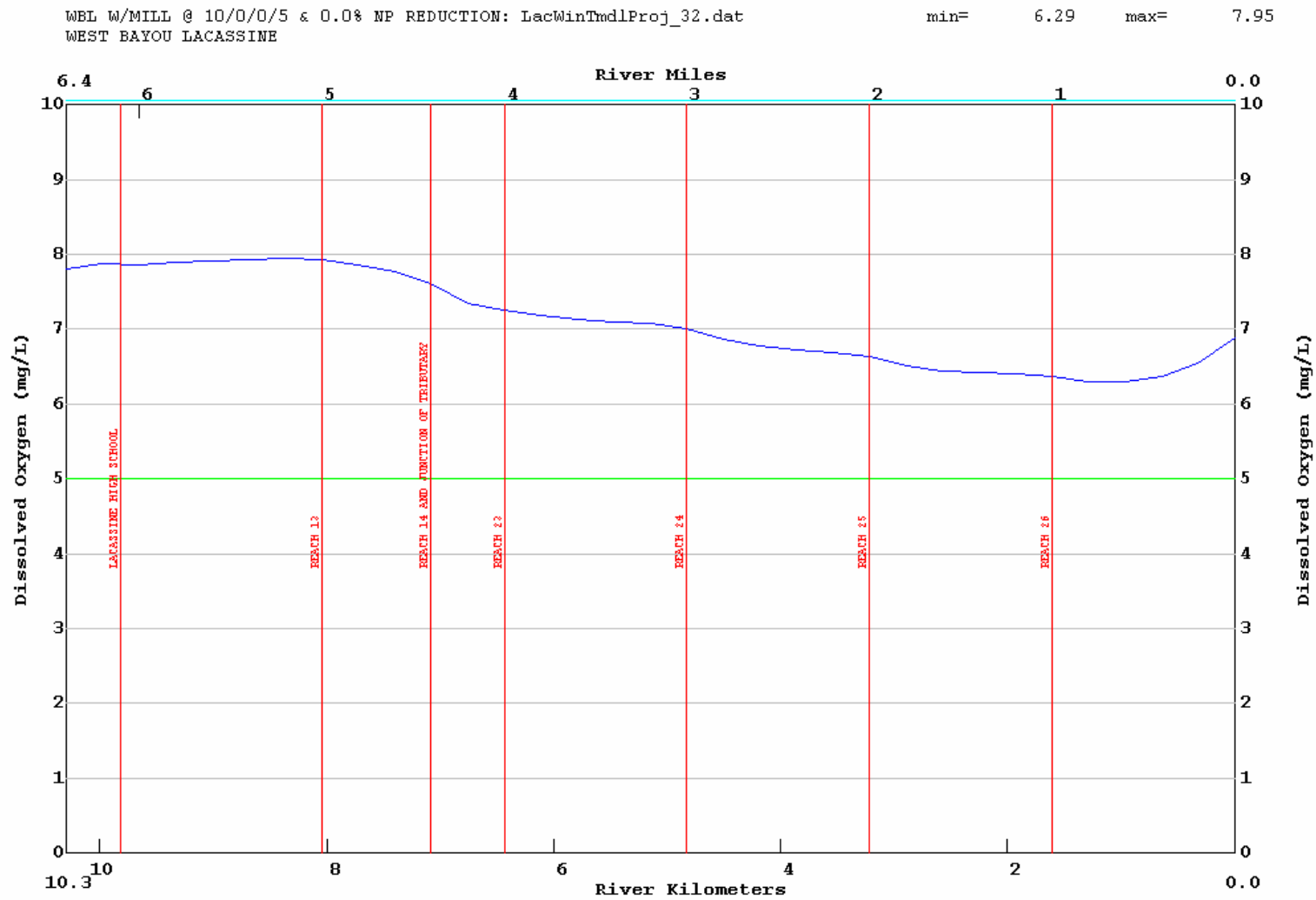
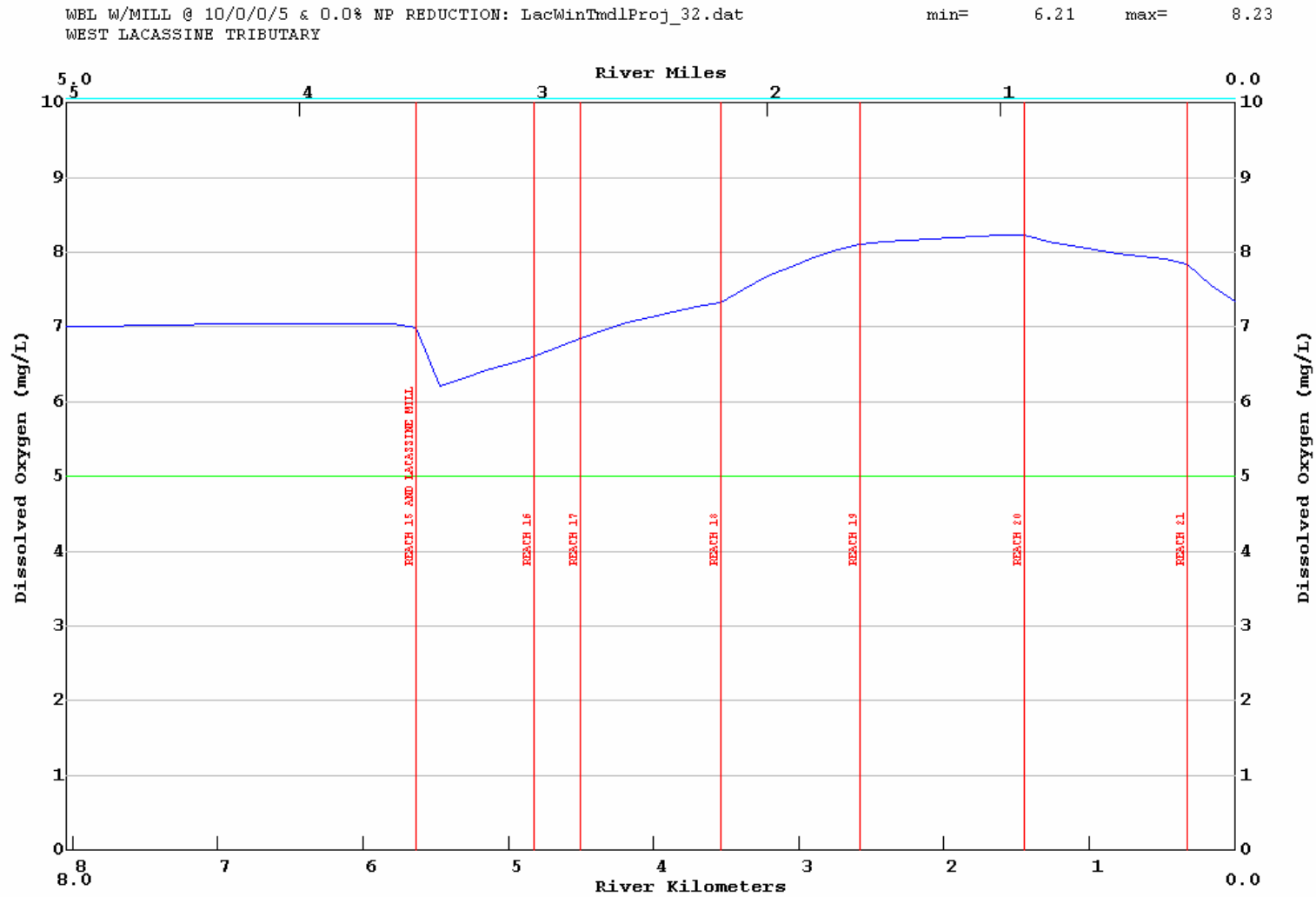


Figure 9



Conclusions

Wasteload allocations for the summer (March – November) and winter (December – February) seasons have been developed for this discharge, and will be incorporated in the Bayou Lacassine TMDL as follows:

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CBOD5 (maximum) 5.0 mg/l

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